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ABSTRACT

The theory of scientific management was established as a way to increase workers' productivity. The following are among the key principles underpinning scientific management: task simplification and division of labor boost productivity; management must control the planning of work down to its minutiae; and remuneration should be based on output. Scientific management encountered important difficulties in practice, including alienation of employees and difficulty balancing quality against the dominant theme of quantity. Several parallels can be drawn between Australia's training packages and scientific management. Like scientific management, training packages are based on the concept of performance of a limited and highly structured range of tasks. Consequently, the level of training packages' "atomization" of competencies adds to their level of complexity rather than addressing it constructively. Second, the scientific management paradigm is incompatible with "soft skills" or the affective/interpersonal domain. Deskilling and assessment of skill/knowledge is another problem area. One of the major problems with the training package concept is that it confuses education with "the material arrangements through which we seek to provide education" (namely, jobs and job descriptions). The temptation to "cut quality corners" is another problem associated with training packages that stems from their reliance on the principles of scientific management. (Contains 20 references.) (MN)

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Training packages: the scientific management of education

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The main thesis of the paper is that Training Packages are management tools that are grounded in a particular school of management theory: Scientific Management. It is proposed that Training Packages have little to contribute to the learning process and are, in effect, highly detailed job descriptions.

An overview of Scientific Management provides a context for the ensuing discussion in which the link between Training Packages and Scientific Management is explored. The parallels between Scientific Management and Training Packages are considered in terms of the themes of 'specialisation'; 'deskilling and assessment of skill/knowledge'; and 'quality'.

The relationship between Scientific Management and the Australian Qualification Framework and procedures such as Recognition of Current Competencies is also considered.

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Scientific Management is identified as providing the conceptual foundation of Training Packages and following the questions will be addressed: What are the main features of Scientific Management and how are these reflected in Training Packages? What changes in policy direction should be contemplated in view of the influence of Scientific Management?

Scientific Management

Frederick W Taylor (1856-1915), an American Engineer, founded Scientific Management. Task simplification, the aim of which is to increase productivity, is at the core of this theory. Taylor, however, was not the first to recognise the 'simplification-productivity' connection. Adam Smith (1723-1790) is credited with this. Smith observed that the 'division of labour' could lead to dramatic increases in output. He used the example of pin-making to illustrate this point:

> ... a workman not educated to this business ... could scarce ... make one pin a day, and certainly not make twenty. But in the way in which this business is now carried on, not only is the whole work a peculiar trade, but it is divided into a number of branches. One man draws out the wire, another straightens it, a third cuts it ... the important business of making a pin, is, in this manner, divided into about eighteen distinct operations ... (Smith 1910, p 5)

Smith also considered the gains in productivity that resulted from the division of labour. Rather than a single pin, he concluded the individual worker could produce some 4,800 pins a day.

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These themes find expression in Taylor's work, but rather than pin-making, his interest was shovelling:

> By 'science' Taylor means systematic observation and measurement, and an example ... that he often quotes is the development of the science of shovelling. The scientific study of shovelling involves the determination of the optimum load that a 'first class man' can handle with each shovelful. Then the correct size of shovel to obtain this load, with different materials, must be established. Workers must be provided with a range of shovels and told which one to use. They must then be placed on an incentive payment scheme ... (Pugh and Hickson 1983, p 100)

Other aspects of Taylor's theory are alluded to in the above. The reference to '*tell* workers which shovel to use' concerns the view that management must control the planning of work, down to its minutiae. Discretion, and perhaps even the expectation that one should 'think', must be eradicated. Second, the idea of 'incentive payments' refers to schemes of 'payment by results', or units produced in a given time. In these schemes, the greater the output, the higher the remuneration.

The quotation also hints at the values that underpin Scientific Management. For example, Taylor also conducted experiments on loading pig-iron and said:

> One of the first requirements for a man who is fit to handle pig-iron as a regular occupation is that he shall be so stupid and so phlegmatic that he more nearly resembles an ox than any other type.
> (quoted in Bell 1960, p 233)

This charitable attitude was shared by Frank (1868-1924) and Lillian Gilbreth (1878-1972), to whom we are indebted for 'time and motion study'. The Gilbreths, contemporaries of Taylor, gave the following responses to questions about Scientific Management:

> Does it not make machines out of men?
> Answer: It is the aim of Scientific Management to induce men to act as nearly like machines as possible.
> Is it not especially hard on the 'weaker brothers'?
> Answer: Yes, if 'weaker brothers' means unwilling incompetents.
> (quoted in Spriegel and Myers 1953, p 8)

The parallels extended to personality types, as evidenced by the following descriptions of somewhat obsessive-compulsive behaviours:

> Taylor split his world into its minutest parts ... When he walked, he counted his steps to learn the most efficient stride. Nervous, highstrung ... he was a victim all his life of insomnia and nightmares, and fearing to lie on his back, he could sleep in peace only when bolstered upright in a bed or in a chair. He couldn't stand the sight of an idle lathe or an idle man. He never loafed and he was going to make sure nobody else did.
> (Spriegel and Myers 1953, p 8)

Similarly, Frank Gilbreth:

> ... learned to simultaneously use two shaving brushes to put on shaving cream, thereby saving seventeen seconds. When he tried shaving with two razors, the process took forty-four seconds less than with one razor. Unfortunately, the bandages to the resultant cuts took two minutes to

> apply ... the loss of two minutes, not the cuts, made him abandon the use of two razors. (Bartol et al 1999, p 51)

Scientific Management encountered difficulties in practice - workers went on strike in one of the first organisations that systematically applied Scientific Management principles (Bartol et al 1999, p 51). Some of the complications engendered by Scientific Management were: a need for coordination; alienation of employees; and difficulty balancing quality against the dominant theme of quantity.

Coordination relates to Taylor's view that management must control work planning. However, the application of Scientific Management principles poses a significant problem: once a process has been fragmented, one is nonetheless faced with the need to stick all the bits back together again into a coherent whole. To achieve this, centralised synchronisation is required. Should it be lacking, a number of problems arise: duplication, variations in standards and inconsistencies, to mention a few. Industry is familiar with the problems inherent in the production-line method. Various experts are required to coordinate activity to ensure the production process is 'kept in balance'. This can entail significant costs- some of which are 'human'.

Disaffection is a facet of work simplification, which arises largely from deskilling. Such factors as high turnover and absenteeism rates can ensue. Industry has attempted to overcome some of these problems by introducing different forms of work, in which multi-skilling is an essential element.

The emphasis in Scientific Management is on production and output; as indicated, this is reflected in schemes of 'payment by results'. This is not to suggest that quality is totally disregarded. For example, in industry, Quality Circles are used to compensate for the focus on quantitative, as opposed to qualitative, objectives. The point here, however, is that quality often 'comes a poor second best' in systems founded on Scientific Management.

Taylor's theories have been associated with the broader notion of 'Fordism' - a reference to the automotive company - that pioneered systems of mass production.

How then are these various principles and pitfalls of Scientific Management manifested in Training Packages?

Training packages and scientific management: the parallels

The relationship between Scientific Management and Training Packages will be examined in terms of 'specialisation'; 'deskilling and assessment of skill/knowledge'; and 'quality'. Before this analysis, a brief overview of Training Packages is provided.

Training packages: an overview

A Training Package consists of 'endorsed' and 'non-endorsed' components. We will confine ourselves to the endorsed components: competency standards, or Units of Competency; Qualifications; and Assessment Guidelines.

A competency 'Comprises the specification of knowledge and skill and the application of that knowledge and skill to the standard of performance required in the workplace' (Australian National Training Authority 1998, p 15).

Qualifications involve 'packaging' competencies in accordance with the Australian Qualifications Framework. This provides a structure for all recognised qualifications, from the Senior Secondary Certificate to a PhD. For Training Packages, the relevant qualifications are the Certificate I, II, III and IV and the Diploma and Advanced Diploma (Australian National Training Authority 1998, p 26).

Assessment consists of five elements, including the qualifications required of Assessors and guidelines for designing and conducting assessments. The role of an Assessor is related to what has been variously labelled 'Recognition of Prior Learning', 'Recognition of Current Competencies', and 'Skills Recognition'. One of these has been described thus: 'Recognition of prior learning focuses on identifying the endorsed industry/enterprise competency units currently held by individuals as a result of formal and informal training' (Australian National Training Authority 1999b, p 29).

Thus, an Assessor, through a process of evidence gathering, may issue qualifications based on the skills/knowledge a person has acquired. To be entitled to perform this activity, Assessors must have the relevant vocational competencies at least to the level being assessed, and two assessment units of competence from the *Assessment and Workplace Training* Training Package (Australian National Training Authority 1998, p 20).

Specialisation

The first Training Package was endorsed in July 1997 and there are currently some 60 packages, which are either industry or enterprise based.

This represents the first level of specialisation, as it implicitly assumes that knowledge/skills are industry/enterprise specific. One could perhaps add that Training Packages reform seems to assume that the only thing worth learning about is work.

Additional fragmentation often occurs within Training Packages. For example, the *Textiles, Clothing and Footwear Training Package* consists of sixteen volumes covering such industry sub-sectors as 'Dry Cleaning Operations' and 'Footwear Repair'. The Package contains some 300 Units of Competency, including a number that have been 'imported' from other Training Packages (Australian Light Manufacturing Industry Training Advisory Board 2000, p 1).

Units are further subdivided into 'Elements' and 'Performance Criteria'. In order to assist with the understanding of these, a 'Range of Variables' and 'Evidence Guide' is also provided. The Range of Variables identifies 'the range of contexts and conditions to which the Performance Criteria apply' and the purpose of the Evidence Guide is to assist with the 'interpretation and assessment of the unit' (Australian National Training Authority 1998, p 12).

An example will help illustrate the relationship between all of these Training Package paraphernalia. 'Wash Dishes' is a Unit and the Elements are: 'Prepare to wash dishes'; 'Wash dishes'; 'Dry dishes'; and 'Store dishes'. Performance Criteria include 'correct amount of dishwashing liquid/powder is used'; and 'correct washing implements are used'. The Range of Variables incorporates 'removing blemishes from pots and pans may require pots and pans to be either scrubbed by hand or soaked and rewashed' and the Evidence Guide makes this indispensable contribution – 'resource requirements include equipment such as dish washers'! (Community Services and Health Training Australia 1999a, p 66).

It might be argued that a simplistic example has been selected. However, there are other instances in Training Packages of what might be described as a 'limited, task focus'. Thus, there are Units of Competency for 'Ride courier/delivery bicycles' (Transport and Distribution Training Australia 1997, p 106); 'Climb small trees' (Rural Training Council of Australia 1998, pp 2-56); 'Prepare a bed for occupancy' (Community Services and Health Training Australia 1999a, p 55); and 'Wash and squeegee glass surfaces to remove all visible dirt and grime' (Property Services Training Australia 1998a, p 79). In relation to this last Unit, one wonders if there would be much point in removing 'invisible' dirt and grime.

In making these observations, it is not the author's intent to disparage either the skills involved, or those who exercise them. Nonetheless, we need to ask ourselves if the level of specification is not very similar to measuring shovelling or, for that matter, shaving with two razors. The principles are the same. The fundamental problem is that the principles are inappropriate for the purpose to be served - that being learning. The following illustrates this point:

> If a job is broken into fragments ... learning to integrate them into one smooth, continuous process could create a problem. Learning is also inhibited if the segments to be mastered are too small or meaningless.
>
> The Supervisor may have to encourage the learner to try out what seems at the outset to be an impossibly large segment; but it is more efficient in the long run for the trainee to make many mistakes, trying to master a logically constituted unit than to concentrate on learning the parts as if each were to be performed separately.
> (Sayles and Strauss 1981, p 206)

As the above suggests, the consequences of relying on an industrial model - and an outmoded one at that - to perform an educational function are potentially very damaging. This is recognised in a recent Senate report:

> The atomised and apparently menial tasks required of workers leads to the view that those holding vocational skills are unable to think intelligently or creatively, or to take initiative. Here, vocational education, operating on this set of assumptions, serves the dictates of an essentially Fordist model of production which subordinates creativity and intelligence to the performance of a limited and highly structured range of tasks.
> (Senate Employment, Workplace Relations, Small Business and Education References Committee 2000, p 4)

The 'performance of a limited and highly structured range of tasks' is precisely what Training Packages are all about, as they are premised upon Scientific Management

assumptions. The lack of coordination that can be symptomatic of this approach is evident in Training Packages. For example, there is a proliferation of very similar - if not duplicated - Units. This creates, amongst other things, a record keeping nightmare.

Earlier, 'variations in standards', 'incompatibility' and 'inconsistencies' were raised as additional problems associated with Scientific Management. These issues are also encountered in Training Packages. There is significant variation in the quality of Training Packages and incompatibility and inconsistencies become evident when the importation of Units of Competency from one Training Package to another is considered.

As noted, multi-skilling has been one response to the problems generated by Scientific Management. One purpose of multi-skilling is to broaden the range of skills of employees. Similarly, there has been a call to give greater emphasis to broader, generic skills to compensate for the 'narrow, task-based focus' of Training Packages (Senate Employment, Workplace Relations, Small Business and Education References Committee 2000, p 24).

There is a mechanism within Training Packages that attempts to address this:

> Many stakeholders believe that the National Training Packages do not provide adequately for the achievement of the broader, generic skills, known as 'soft skills' or the Key Competencies. The Key Competencies are a set of generic competencies that people need for effective participation in the workforce.
> (Senate Employment, Workplace Relations, Small Business and Education References Committee 2000, p 25)

There are two problems with the notion of Key Competencies.

First, the level of 'atomisation' wrought by Training Packages is such that Key Competencies add to the level of complexity, rather than address it in a constructive manner. Far from offering a solution, Key Competencies have become part of the problem.

Second, the Scientific Management paradigm is incompatible with 'soft skills' or affective/interpersonal domain. For example, there are Units of Competency that have statements such as:

> Individuals or groups behaving in a suspicious and/or unusual manner are identified and monitored according to agreed assignment instructions (Property Services Training Australia 1998b, p 137);
>
> People are treated with integrity, respect and empathy (CREATE Australia 1999, p 528);
>
> Enjoyment and fun are promoted (Community Services and Health Training Australia 1996, p 110);
>
> Communication with children will vary according to the age of the child - for babies and infants, some examples are:

- worker responds to non-verbal cues and decides whether a response is required
- imitation or reflection of babbling and cooing (Community Services and Health Training Australia 1996, p 110).

The above outputs are intangible and do not lend themselves to Scientific Management forms of measurement. How, for example, does one objectively assess what constitutes a level of proficiency in 'identifying suspicious behaviour', 'treating people with integrity, respect and empathy', or 'imitating babbling and cooing' to warrant the determination that a person is competent? The simple answer is 'you can't', and attempts to do so verge on the absurd.

Deskilling and assessment of skill/knowledge

As previously mentioned, Training Packages encompass the notions of Assessor, Recognition of Current Competencies and the Australian Qualification Framework.

It will be recalled that the only *educational* qualification required of an Assessor is that s/he holds selected assessment Units from a particular Training Package. This represents a significant diminution of past educational requirements. The expectation would now appear to be that those involved in the delivery of vocational education are no longer expected to educate - or, for that matter, train - but rather merely 'assess and record'. This represents a level of workforce deskilling of which Taylor himself would be proud.

This deskilling process is inexplicably linked to the concepts of simplification and recognition of competencies. For example, the simpler the thing to be assessed, the greater the justification for reducing the qualification level, and thus remuneration, of the person undertaking the assessment.

Simplification also lends itself to non-demanding methods of making recognition judgments. Assessment for recognition is often a 'checklist' exercise of dubious validity and reliability. Further, the process is retrospective: the focus is on the skill/knowledge 'acquired' rather than 'required'. This creates a significant risk that the need to develop new areas of skill/knowledge gets lost in bureaucratic paperwork which is rooted in the past.

A related problem is that recognition processes are product orientated. The aim is to determine 'what' skill/knowledge a person has; the question of 'how' that skill/knowledge was realised is, in essence, considered irrelevant.

However, learning is as much about the means or process by which skill/knowledge is acquired, as it is about the ends or products of that process. It is about being inspired to seek out learning opportunities. It is also about being aware that the relationship *between* different domains of skill/knowledge can be as important as 'competence' within a discrete area. We ignore these more subtle aspects of learning at our peril. If we continue headlong down the Training Package path, we may well end up with a workforce of automatons: people who are proficient in narrow, specific fields but unable to 'think for themselves', as the education system failed to

emphasise the importance of the intrinsic value of learning, and the significance of the relationship between different bodies of skill/knowledge.

Given the foundation of Units of Competency upon which the Australian Qualifications (AQF) Framework is built, it could be anticipated that this structure would have some shortcomings. One of these is the relationship between training and jobs that some Training Packages establish. For example, one Training Package contains the following statement:

> Employees in positions at the Operator level in the industry can access qualifications at either AQF Certificate II level or AQF Certificate III level. The AQF Certificate IV level encompasses the competencies expected of supervisors, team leaders and site coordinators. An AQF Diploma is the entry point for management training ...
> (National Mining Industry Training Advisory Body 1998, p 15)

As competencies are work-based, how then does the Operator, who aspires to a promotional position, attain the competencies of those positions? It's a Catch-22 - if you haven't got the job in the first place, you cannot demonstrate the competencies, and, no doubt, you can't get the job until you exhibit that you have the competencies required for the position!

It could thus be argued that the qualification framework 'locks employees in' to an existing occupational hierarchy and reinforces organisational rigidity and educational inequality. This seems to be the converse of the Training Package rhetoric: 'All the endorsable components should ... support broad and flexible career paths, transferability, portability, varied learning pathways and high quality training and assessment outcomes ...' (Australian National Training Authority 1998, p 8).

There is also a problem of comparability of qualifications. For example, it is possible to attain a Certificate III in Asset Maintenance - Cleaning Operations (Property Services Training Australia 1998a, p 8). Under the framework, this has a status equivalent to that of say, a Certificate III in Information Technology. Whilst not wishing to devalue cleaning, would the Information Technology Graduate not have a legitimate argument should s/he claim that her/his qualification should have a somewhat elevated status on the basis that cleaning does not demand the same level of skill/knowledge and rigour (intellectual or otherwise) as computer programming? The structure has no means of differentiating the content of what is learned, or comparing the standards of one qualification against another, and it should.

When one combines the nature of some of the Training Package qualifications with the concept of recognition, some interesting scenarios come to mind - we could have credentialism gone berserk! For example, one could envision that every person in the country with domestic duties would be entitled to some level of qualification in cleaning; they need only be assessed. The following quotation from a recent newspaper article is relevant in this context:

> We need to divorce ourselves from the crippling and delusive idea that education is a service industry similar to dry-cleaning, identical with the material arrangements through which we seek to provide it.
> (Maskell 2000, p 31)

As indicated at the outset, this is one of the major problems with the Training Package concept: it confuses education, which can be employed to enhance understanding about jobs, with 'the material arrangements through which we seek to provide education', these being jobs - or the descriptions of those jobs - themselves.

Quality

All of the matters raised so far point to the issue of quality. However, one additional topic, which represents an indirect link between Scientific Management and Training Packages, deserves mention. This is the emphasis on production and the related practice of 'payment by results'. It is important to question the dominance of these, as they create a strong temptation to 'cut quality corners'.

Funding arrangements in vocational education are based on units of production, with the 'number of hours generated' being the basic measure of output. For example, the Senate report referred to earlier indicates that the measure of 'Assessable enrolment-successfully completed Annual Hours Curriculum' increased from 171, 983, 920 to 183, 838, 731 from 1998 to 1999 (Senate Employment, Workplace Relations, Small Business and Education References Committee 2000, p 19).

Quality, however, is the main theme of the report:

> The majority report contains 28 recommendations to the Government. These go to the heart of restoring quality in vocational education and training ... focusing mainly on strengthening institutional arrangements which ensure compliance with quality control processes.
>
> (Senate Employment, Workplace Relations, Small Business and Education References Committee 2000, p 9)

These arguments are not to deny the need for some form of accountability. However, a better balance between indices of quantity and quality is urgently needed - this is something with which the authors of the Senate report would, in all likelihood, concur.

As an aside, one suspects that part of the problem here is one of 'ease'. Quantitative indicators, such as hours, are easy to measure, whereas qualitative factors, particularly in a field as elusive as 'education', are much more difficult to identify. This engenders a tendency to focus on the easily measurable. The problem here is that we run the risk of assuming that simply because something is easy to measure, it is important - a status it may well not deserve!

Conclusion

This analysis has obviously been critical and, in conclusion, it seems reasonable to consider what constructive changes might be made.

One is tempted to 'discard the lot'. However, this would be to deny the efforts and goodwill of what is probably a small army of Training Package writers and reviewers - not to mention the cost.

As has been emphasised throughout, the core of the problem is that Scientific Management provides the conceptual underpinning of Training Packages. This is a fundamental flaw that needs to be more widely recognised, and then acted upon. In practical terms, it is suggested that:

1. A moratorium be instituted in relation to the implementation of any new Training Packages and/or any additions, addendums, or any other further development of them.

2. A review of Training Packages be instituted. This would be a holistic review, encompassing all Training Packages, and the interrelationships between them, with the purpose of:

    - eliminating the duplication in Units of Competency between, and within, Training Packages;

    - rewriting all Units of Competency in much more generic terms to overcome the restrictive bias towards the performance of narrow tasks. This revision is of particular importance in the area of so-called 'soft skills'

3. Much greater emphasis be given to qualitative indicators of performance in vocational education. This could be largely accomplished through implementation of the recommendations of the Senate Employment, Workplace Relations, Small Business and Education References Committee.

The idea of a nationally recognised qualification structure is excellent. However, a competency-based curriculum is not essential to such a structure. The same can be said for processes of recognition. Both of these useful initiatives can exist in the context of a broad, rather than competency-based, curriculum.

It seems in keeping with some of the themes in this paper to end on a lighter note. There is a Unit of Competency entitled 'Work with Crocodiles' (Seafood Training Australia 2000, pp 4-103), and in the Range of Variables there are a number of indicators that provide assistance with the assessment of 'abnormal behaviour'. Some of these indicators appear below, along with italicised comments, these being those of the author:

> Abnormal behaviour or other indications of health problems:
>
> - inactivity
>
> *(to assess, prodding/poking is unavoidable - for this purpose, however, it is highly recommended that an implement, such as a long stick and/or broom handle, be employed)*;
>
> - loss of coordination
>
> *(to assess, determine if subject repeatedly trips over logs and/or gets hopelessly tangled up in swamp vegetation)*;
>
> - isolation from other crocodiles

(to assess, determine if subject regularly fails to attend social gatherings, such as the maiming of unsuspecting tourists and/or their family pets);

- death

(to assess, the same test as that which applies for 'inactivity', with the exception that more vigorous prodding/poking may be employed - please note: extreme caution is recommended as this indicator has yet to be field tested).

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